

Appendix A

Image Gallery

This appendix presents a visual record of the development and testing process behind the automated LiDAR-to-mesh prototype. Each image captures key stages, experiments, outcomes, or challenges that contributed to the final state of the project.

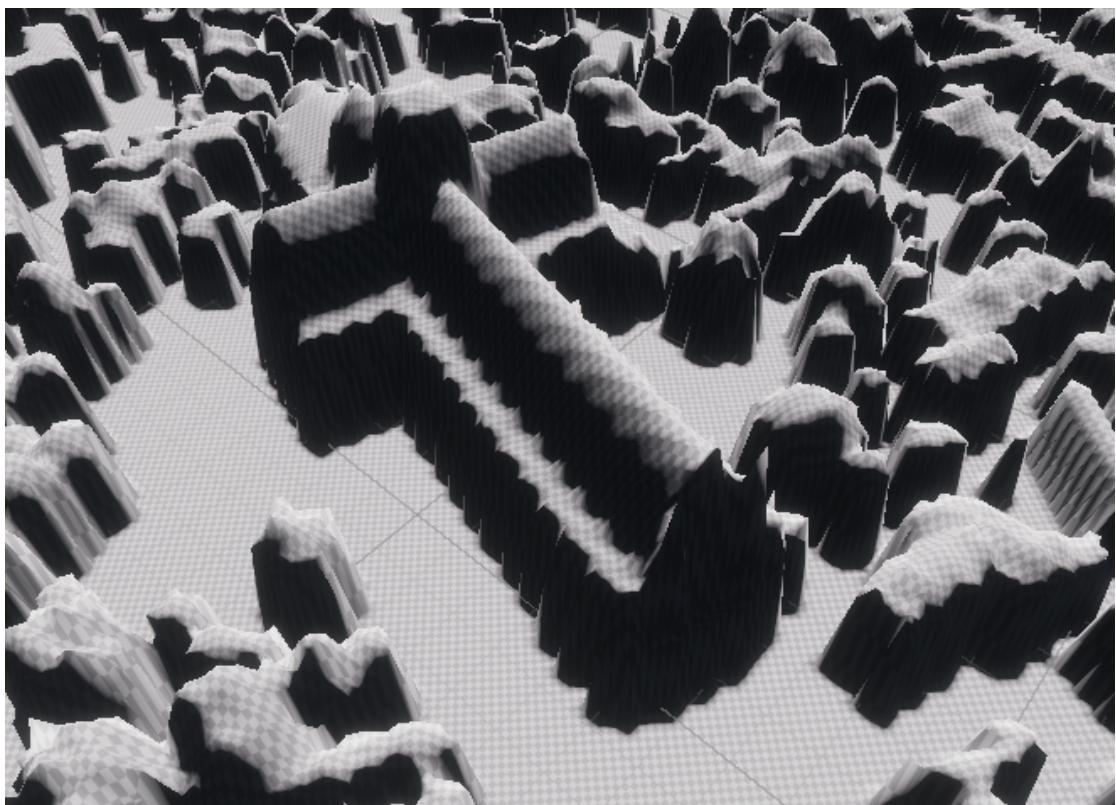


FIGURE A.1: First sight — early preview of clustered mesh reconstruction, with cathedral visibly central in the urban layout.

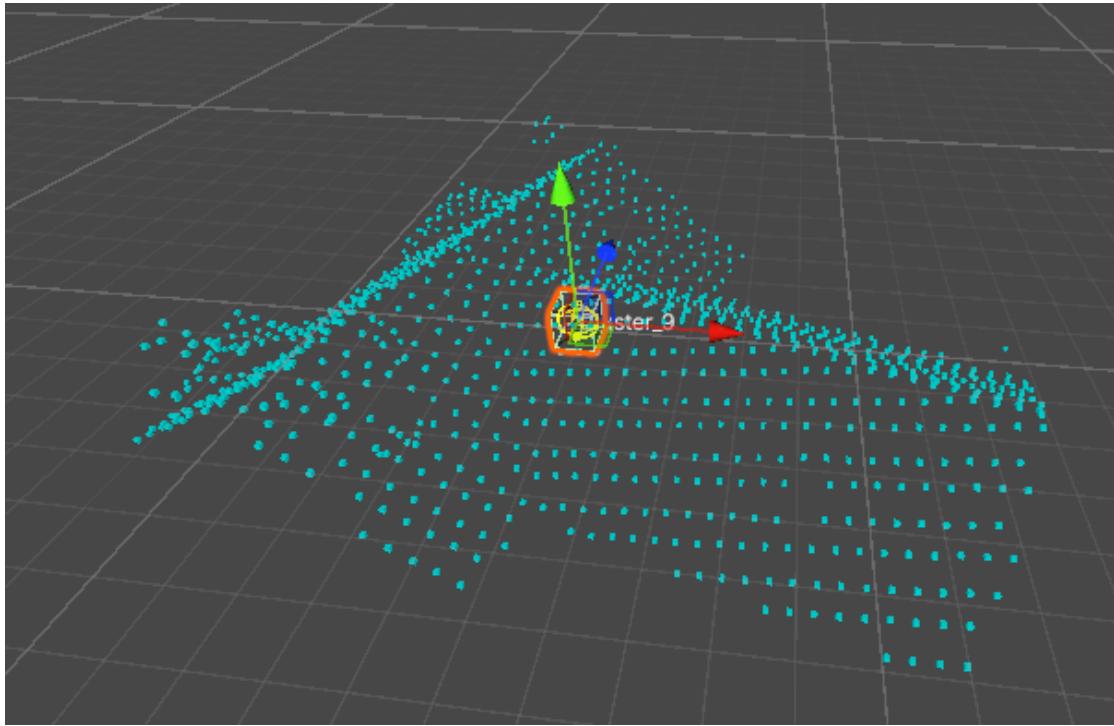


FIGURE A.2: First look at point cloud cluster in Gizmos — Unity scene view showing one of the generated point cloud clusters, with pivot tools for inspection and debugging.

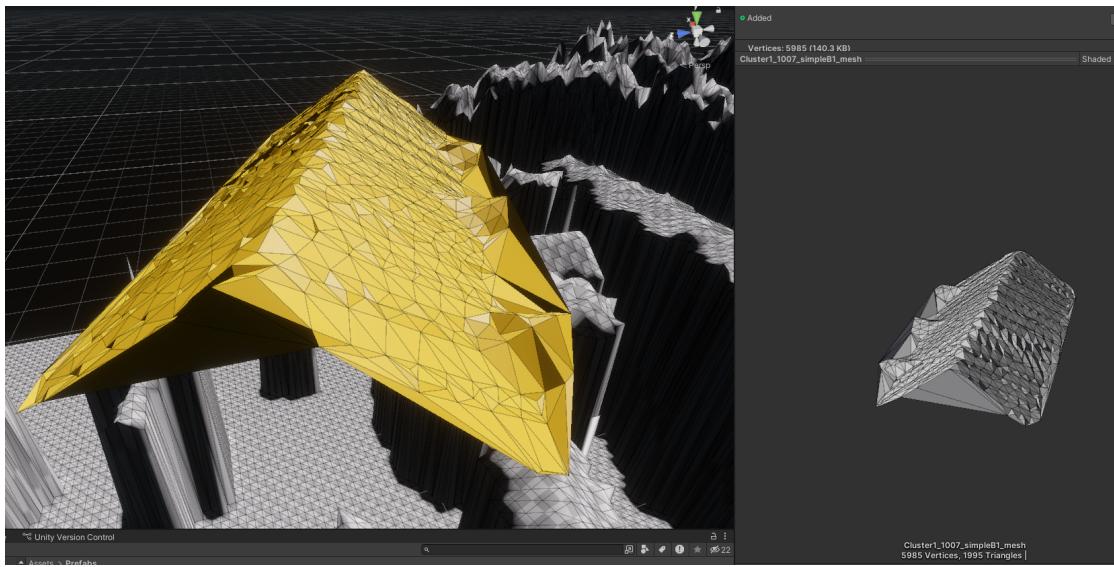


FIGURE A.3: First mesh — preview of the initial generated building mesh in Unity, highlighting roof geometry and vertex detail.

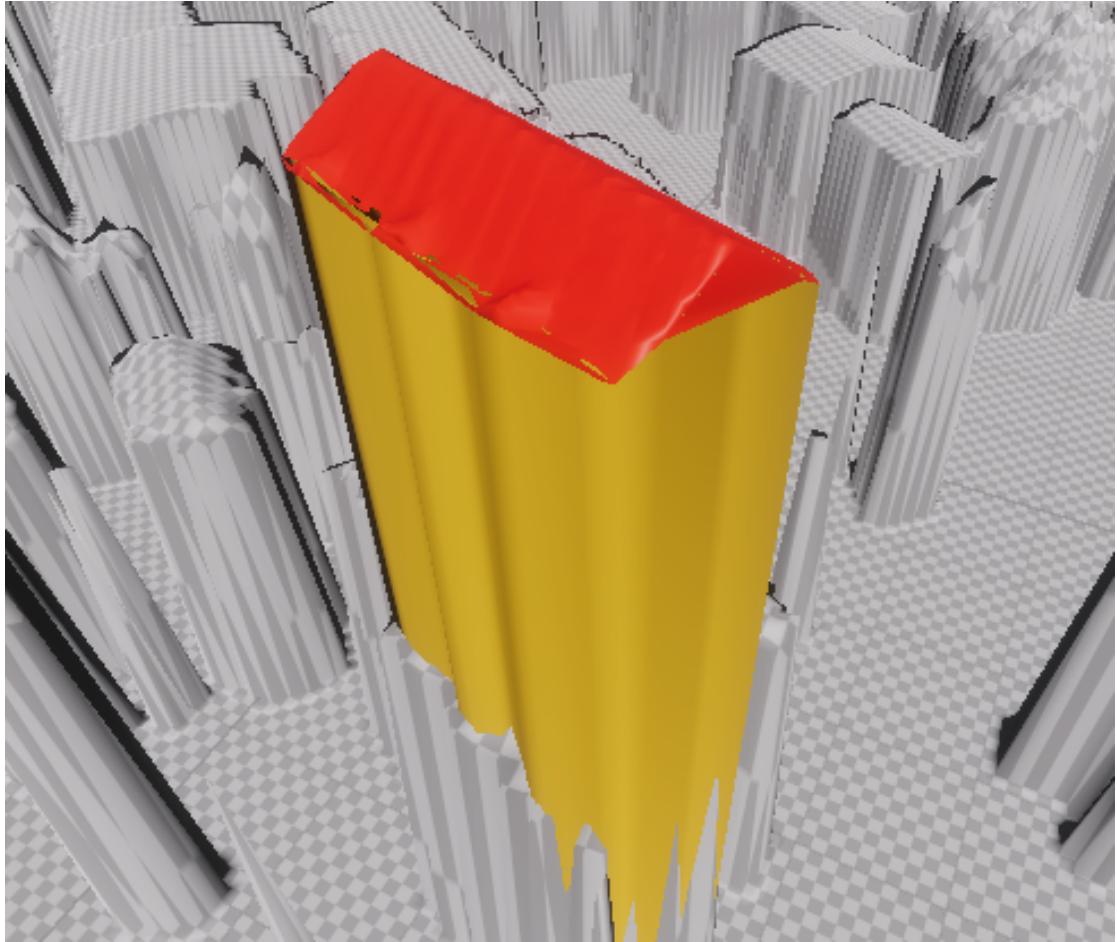


FIGURE A.4: First roof and body — early attempt at separating roof geometry (in red) from the building body (in yellow), based on clustered point classification.

This gallery not only highlights the technical journey of the prototype, but also documents the learning curve, creative decisions, and practical limits of working with high-resolution LiDAR data inside Unity.

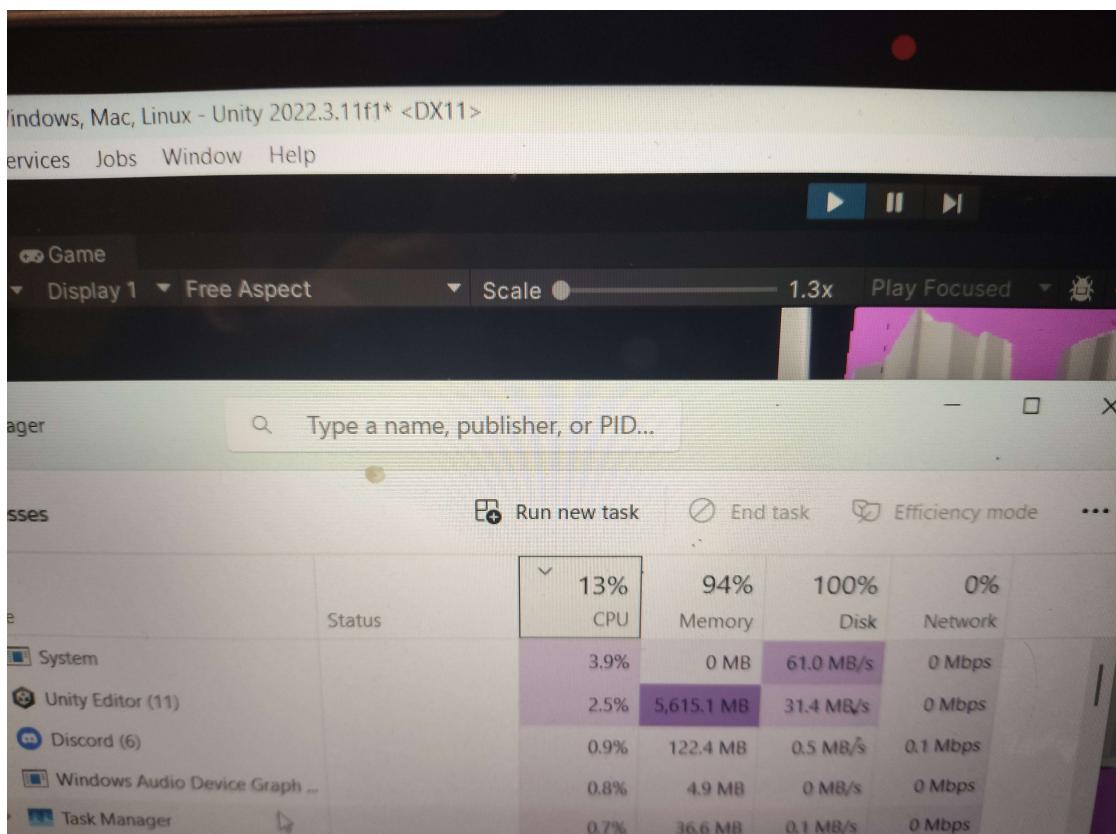


FIGURE A.5: Oh Memory — Unity Editor showing high RAM usage during mesh generation, highlighting performance limitations on standard hardware.

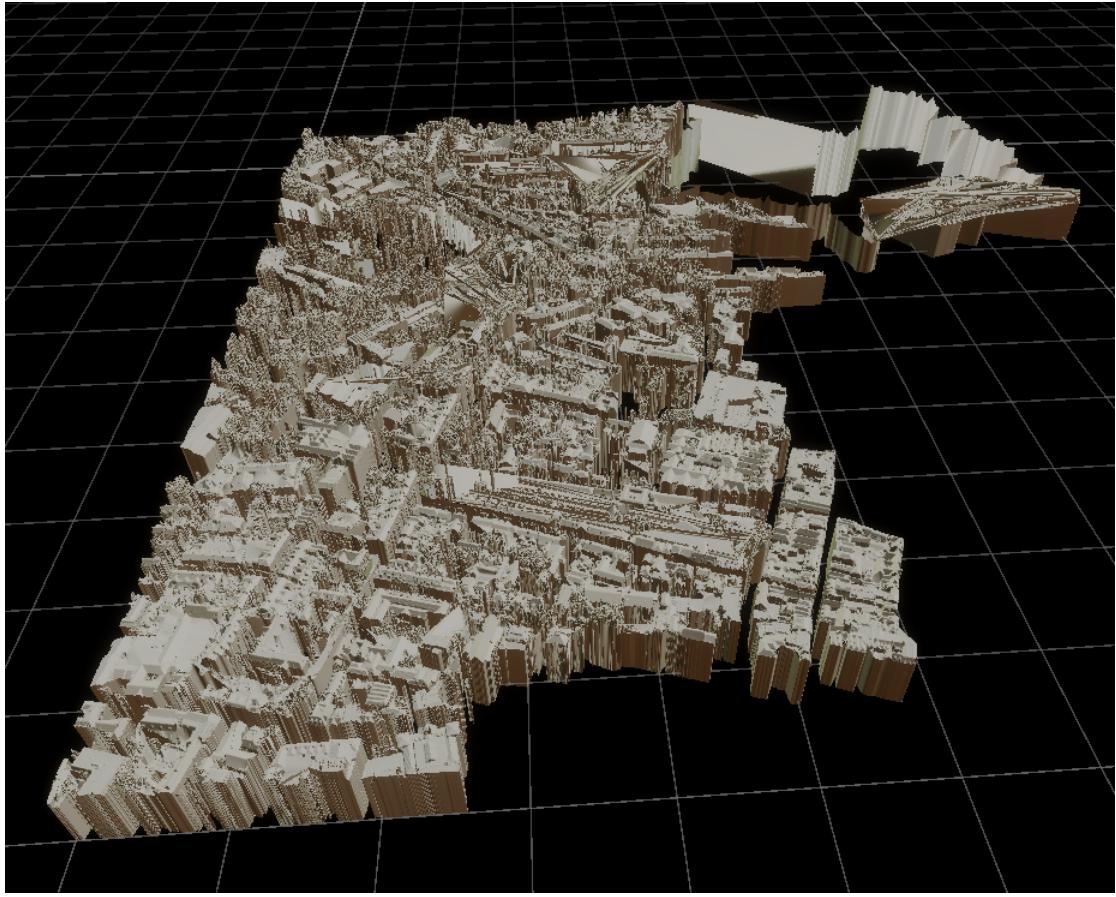


FIGURE A.6: First big test — large-scale reconstruction attempt that failed after exceeding Unity’s limit of 10,000 active meshes. Highlights the challenge of scaling the pipeline on standard hardware.

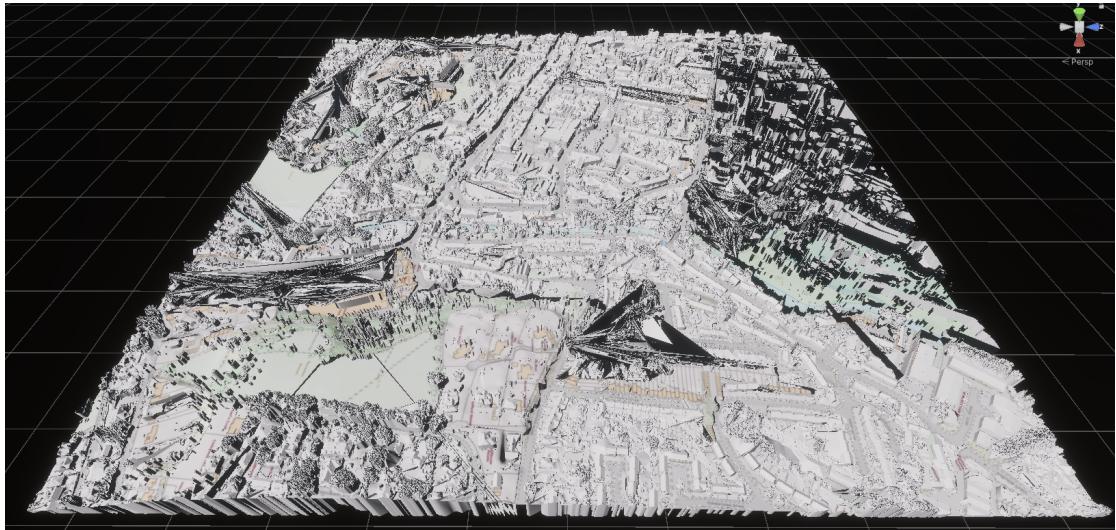


FIGURE A.7: 1st and last full test — complete mesh reconstruction attempt over 125 hours, producing $12,316 \times 2$ meshes per object. Numerous geometry anomalies are visible due to overflow, misalignment, and Unity’s mesh handling limits.

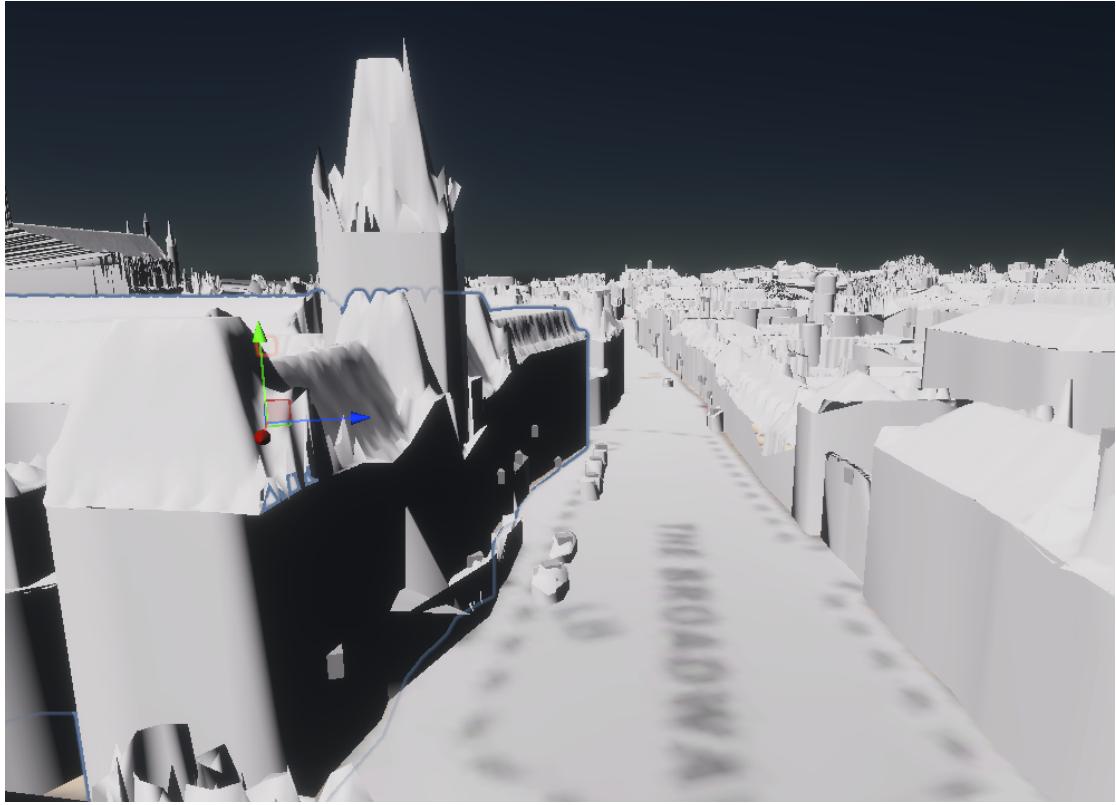


FIGURE A.8: Broadway with Townhall and little cars — a street-level view of the reconstructed urban mesh, showing building detail, vertical exaggeration, and imported road texturing.

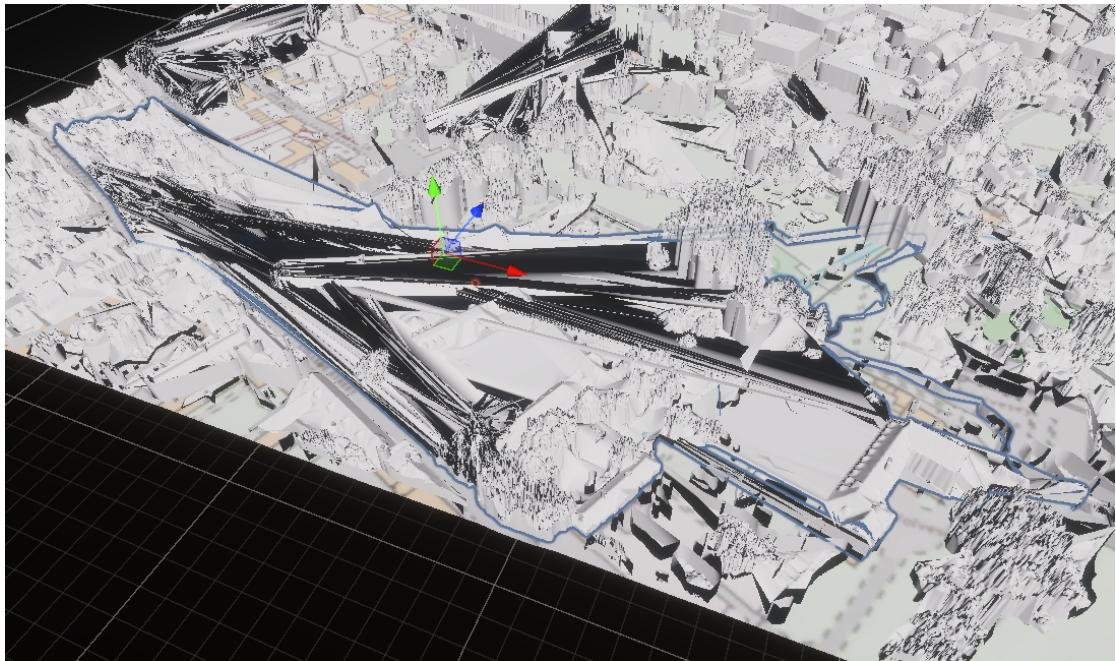


FIGURE A.9: Bizarre massive cluster — mesh anomaly caused by an incorrect or merged point cloud cluster. This artefact demonstrates the risk of overflow or misclassification during large-scale processing.

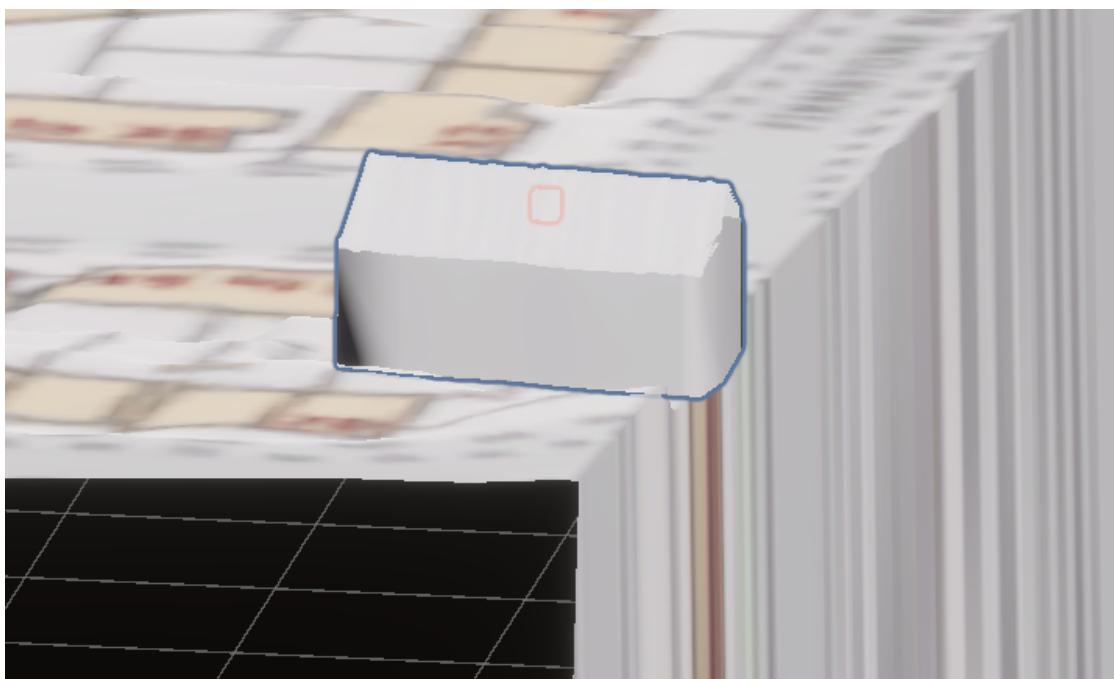


FIGURE A.10: Leaving on the edge — isolated mesh correctly aligned to the Digital Terrain Model (DTM), confirming successful adjustment of height referencing.

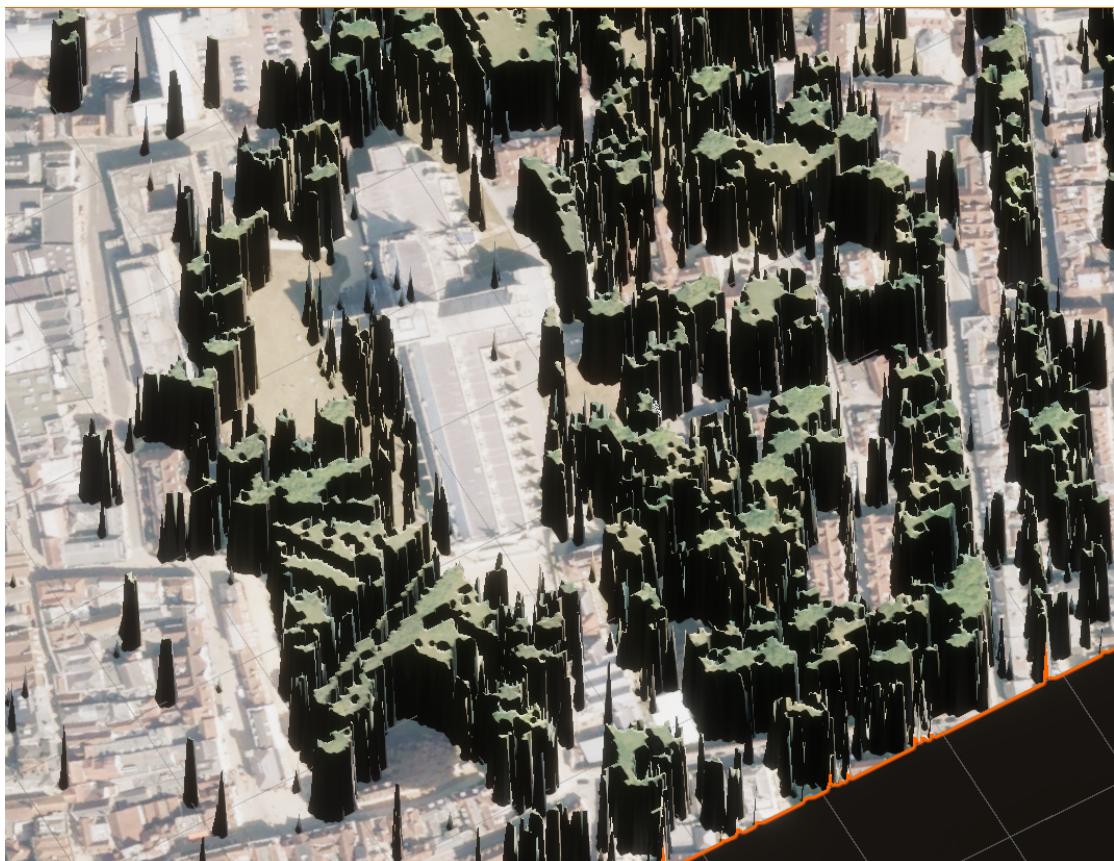


FIGURE A.11: Rise up if you green — visualisation of vegetation points extracted using a texture-based classifier. Successfully classified clusters are shown elevated above aerial imagery, demonstrating classifier performance and spatial alignment.



FIGURE A.12: There is no castle in Lewes — while the topography hinted at an elevated landmark, mesh reconstruction and aerial alignment revealed a hill with no distinct castle structure, confirming the importance of verifying assumptions during 3D modelling.



FIGURE A.13: Lewes town — despite accurate data, the LiDAR reconstruction appears rough and distorted in comparison to Winchester. Highlights the effect of local terrain, point density, and alignment artefacts on visual fidelity.

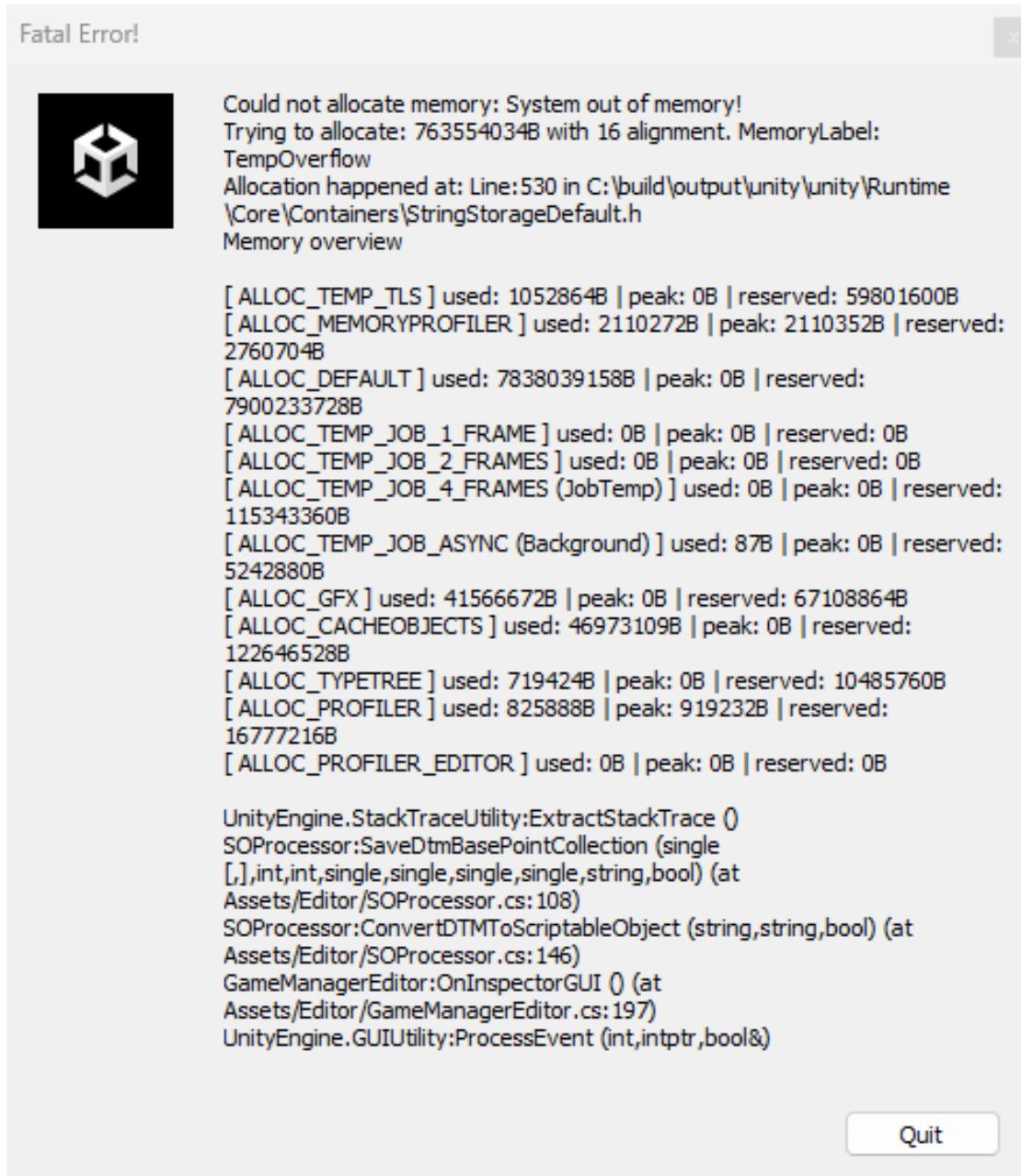


FIGURE A.14: Oh memories! — Unity fatal error message after exhausting system memory during large-scale mesh generation. A fitting summary of the resource demands and performance limitations encountered throughout the project.